

LINCOLN (D.F.)

[FROM THE NINTH ANNUAL REPORT OF THE STATE BOARD OF HEALTH.]

SANITATION  
OF  
PUBLIC SCHOOLS  
IN  
MASSACHUSETTS.

BY

D. F. LINCOLN, M.D.,  
*OF BOSTON.*



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BOSTON:

Band, Abery, & Co., Printers to the Commonwealth,

117 FRANKLIN STREET.

1878.



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## SANITATION OF PUBLIC SCHOOLS.

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THE title of this paper is nearly the same as that of one prepared by Dr. Winsor for the Report of 1874. The object and scope of the two papers are, however, quite distinct. The earlier article stated the evils resulting from study, or school-work, when excessive or ill directed. The present will set forth certain results of an inquiry into the site, construction, sewerage, drainage, and ventilation of school-houses,—points very briefly mentioned by Dr. Winsor,—and in addition will consider the question of the transmission of contagious diseases by schools. The method of research has been by addressing a circular of inquiries to the medical correspondents of the Board, and to a number of teachers in this State.

One hundred and thirty-one (131) separate replies to the circular have been received, representing about four hundred schools, with about forty thousand scholars, in ninety-nine cities and towns of the State, not including Boston. This number (being one-sixth of the school population) is large enough to give valuable indications, which is all that was desired for our present purpose; a basis for statistics not being required. In addition, fifty-five replies have been received from the Boston schools, which will be reported separately after the rest.

### SITE.

*Questions.*—Is the site high, well drained, free from nuisances, sunny, protected from severe weather?

The replies make it clear that the prevailing tendency is to select a high site insufficiently protected. The first four points are answered in the affirmative in 106, 106, 109, and 124 cases; while good protection is affirmed in but 64, and want of protection in 44. The site is low in 16; drainage bad in 18; nuisances exist in 22, some of which are from privies; and defective light is mentioned in four.

In general, less risk is run in building on a high and bleak

site than on one that is low. Exposure to severe weather is undesirable, and it has its dangers; but the greater danger is that which lurks around the spot where moisture lingers on the walls, where the cellar is often wet or damp, where the sun is denied free ingress, and where the drainage of the sinks and privies does not readily pass off. In these points a high ground has evident advantages. But there are exceptions to this: there may be a marshy pool on the top of a hill, and high land may be so constituted, or so stratified, as to be more or less impervious to water (clay, limestone, granite) in the direction it is expected to drain off from the school. How often, too, do we see the privy placed behind the school on slightly rising ground, which must send the drainings towards the building! A gravelly or sandy soil is generally the best suited for natural drainage.

If springs are found when the cellar is dug, the site must be rejected, unless the water can be diverted: it cannot be kept out by simply concreting the floor and walls. The bottom of the cellar ought to be at least three feet above the average level of the water in the soil. If this seems impracticable, let tile-drain be run around the cellar at the depth of its floor, and furnished with a discharge at some lower point. In some cases it will be necessary to place the cellar-floor at or near the ground level, — an obviously effective remedy against ground-water.

“Dryness of the air” is a complaint which is very often made; but it is a slight fault compared with the dampness emanating from floors, walls, and soil, which has been shown by eminent authority to be productive of consumption, catarrh, and rheumatism. The neighborhood of ponds and swamps is therefore to be shunned. Too many trees may be injurious for similar reasons; besides which, they darken the rooms, and make the light unsteady.

As respects a school, all noisy trades or operations, all that pollute the air with smoke, dust, or odor, must be considered nuisances, to be removed or avoided.

*Quotations from Correspondents.*

“Windows too small; light therefore imperfect.”

“One recitation-room into which the sun never comes.”

“Stagnant water all around, no drainage, no protection from the weather.”

“Located on a street-corner, which is particularly exposed to the keen north wind of winter.”

“The yard is a resort for loungers, who commit nuisances around the building, very disagreeable at times.”

“The L. schoolhouse would be better adapted to the use of pupils if it were raised up five feet. This raising of the building now would be an expensive operation. It would have saved a great amount of filth and trouble, if the house had been set up higher when it was built.”

#### VENTILATION, HEATING, AND DRYNESS.

Ventilation was said to be good in fifty-four cases, not good in thirty-nine, fair in eleven; is effected only by doors and windows in twenty-one; ventilators are mentioned as existing in sixteen.

The heating was found unsuitable in but thirteen cases; tolerable in two.

Dampness of walls or floor was noted in but six cases.

A few words may be said here of the methods of ventilation. In the cities, a schoolhouse is now generally built with a supply of flues to carry the foul air from school-rooms. Much skill and scientific knowledge are often directed to the attainment of this end. But it is the experience of the writer, that the best system yet adopted in schools requires a good deal of watching, and cannot be intrusted to the sole care of a janitor. It is for his interest to appear economical of his coal: he is therefore under a constant temptation to check the outflow of warm air from the rooms, and to limit as much as possible the period of airing-out, which should come daily after school. Good ventilation is an end which cannot be gained without the expenditure of much fuel. Much also depends on the master: a vigorous man will love fresh air, and a man of the book-worm temperament may permit a close and dusty atmosphere.

An open fireplace gives a considerable charge of air; not enough, in reality, for a room full of children, but enough to be worth the cost. Very few stoves are of any value as ventilators: those, however, which are built to resemble open fireplaces, and allow a free and abundant passage of air, are excepted from this remark. Fireplaces should never be stopped up, even if disused.

One of the simplest remedies for bad air is to fit a board

under the lower sash, of the breadth of three or four inches only: this shuts out no appreciable amount of light, and raises the sash so that, between its upper part and the lower part of the upper sash, a current of air is admitted in an ascending direction. This is universally applicable, and is extremely useful, though not capable of replacing a complete system of ventilation by tubes.

*Quotations from Correspondents.*

(School of 270 children, built a few years ago.) "Many are the complaints parents make to the doctor, of their children's colds; and headaches, rheumatisms, and pneumonias are laid to the bad air, and justly. If the nondescript towers and the fancy iron railing on the roof, where it is used for some purpose not manifest to the ordinary mind, and the fret-work over the windows, had not been deemed necessary for outside adornment, possibly the appropriation might have allowed a ventilator in the east half as well as the west."

(A large city.) "In a general investigation several weeks since, preparatory to a report upon the sanitary condition of the schoolhouses, the ventilation of all the rooms used for school purposes was found to be extremely defective. Heating is largely done by means of base-burning stoves, which, unless regulated with the greatest care, throw out gas into the rooms, and in any case heat the rooms very unequally, and are extremely unfavorable to ventilation. In many schoolrooms the air was found so impure that a stay of five or ten minutes would make one desirous of again seeking the open air."

"The means are ample [viz., flues and windows]. The difficulty has always been that teachers cannot be sufficiently impressed with the importance of constant attention to the condition of the atmosphere of the rooms. If feeling uncomfortable, warm, or oppressed with contaminated air, they more usually prefer to open windows, and let in a large volume of cold air, without considering the risks attendant on such a course."

(A high school.) "One room, forty-two feet square, is heated by two registers in the floor, and aired by two ventilators in the wall above them; all four are at one end of the room, consequently there is often a difference of 8° or 10° between the two ends."

"The pupils inhale heated air while their feet are cold, and suffer from heat and cold at the same time."

"This school has been reported to the Board of Health three times to my certain knowledge, and no notice has been taken of it. As soon as they found I meant business, then they called me any thing but a good fellow." [The special complaints relate to bad ventilation, draughts on the scholars, nuisance from cesspool, and stagnant water all around the building.]

"One large iron stove in each room, with a long funnel passing over the children's heads, is any thing but a suitable method of heating a schoolroom."



## CELLARS.

*Questions.* — Cellar story or basement: For what purposes used? About how many feet below ground? Wet or damp? What means are used to prevent dampness entering?

Eighteen buildings are reported as having no cellars. It may be well to remark that in such case an air-space of a foot or two ought to be left under the floor, and in moist land this under space should be paved, or even cemented.

As regards the purposes to which a basement or cellar may be applied, some remarks will be made under the next question. It is a good plan to use a part of the space for play-rooms in bad weather, flooring with hard stone or face-brick to avoid the dust which comes from softer materials. The purity of the air that supplies furnaces must be anxiously guarded from contamination through water-closets, rubbish-heaps, &c. A *laboratory* is reported in one instance: this is an unfortunate location for a useful but odorous department, which ought in all cases to be either in a separate building or in the upper story.

No schoolroom should be even partially under ground. This fault is reported as occurring in only five cases.

Dampness is complained of in twenty-one cases. This is a larger number than one would expect, in view of the preference of high sites for building. If a basement or cellar is to be used for play-rooms, dampness is certainly an inexcusable fault. Some of the requisites for good drainage have been mentioned; but in addition, if a cellar-room is to be used for play, the floor and walls should be cemented. An excellent device for floors, lately introduced, consists in damp-proof layers of asphalt and cement in both the floors and walls.

The following extracts from replies of correspondents represent respectively a slight and a bad case of the faults which occur in cellars.

“Play-room, drink-room, closets (one for each sex, with 12 pans each), and furnaces. Tendency to moisture. Some odor in immediate vicinity of water-closets, which are ventilated by windows and connected with sewers.” [Cellar five feet below ground.]

“The cellar is nine feet below ground. Part is used for an evening school, part for the steam-boiler and privies. It is not particularly damp in the part devoted to the latter uses, where there is a cement floor of moderate quality. Under the floor of the room used for the evening

school there are joists laid in what is mostly sand, though purporting to be cement; the floor was recently heaved up here with dampness, and the sheathing is decayed near the floor."

#### WATER-CLOSETS, ETC.

*Questions.*—Are there any water-closets? How many, and on what stories? Of what sort? How ventilated? Do they connect with cesspools, or with sewers? Are there any earth-closets? If so, are they satisfactory? If there are privies, please describe their construction and situation. Are they properly emptied and disinfected? Are there proper provisions for both sexes? Are the children exposed to the weather in visiting them? Are the water-closets, cesspools, or privies sources of offensive odors?

A water-closet is a contrivance for disposing of fæcal matter by "water-carriage," in distinction from the privy or dry-removal system. It usually is found in our schools to be (1) a pan-closet, with a handle, which when raised empties the pan, and lets in fresh water; or (2) a hopper-closet, without the pan, and often provided with automatic apparatus for discharging water into the hopper; or (3) a simple trough of masonry and cement, filled with water, which is frequently renewed. These are the chief varieties. The latter kind has lately been introduced into many large schools, and in some cases it is certainly free from objections. It must, however, be placed in the cellar or basement, in order to prevent freezing; and it is evident that in such a situation it may become a dangerous nuisance. To insure protection, it must be built of masonry cemented, and must slope gently towards the outlet: there should be about it as little wood-work as possible to absorb urine; and the water should be abundant, and changed every day with a good flushing afterwards. The sides should be cleansed at the same time with a jet of water. The space under the seats should be ventilated by a large pipe or pipes led to a flue which does not communicate with the rooms, and which opens above the roof, far from windows: the flue ought to be provided with some means of securing a draught, either by heat or otherwise. It would be proper to lead such pipes to the common chimney, if we could be sure of a fire there all the school-year; but such chimneys often communicate with rooms by fire-

places or ventilators, and, during the month or two when fires are not kept up, it is unsafe to have such an open connection between the vault and the schoolrooms.

The cellar, also, should be watched, and a constant change of air obtained by opening windows according to the weather. There are two reasons why bad air in cellars is specially dangerous to the inmates of schools: (1) because the furnaces are often supplied in part with air from the cellar, which is breathed the next minute in the schoolroom, the air-tube often having a slide expressly intended to admit cellar air, and, even when this bad custom is not observed, the joints of the wooden tube being very apt to be loose; (2) because, independently of this, air has a strong tendency to rise from the bottom to the top of a house, passing rapidly even through floors and ceilings, so that cellar influences are nearly sure to be felt in the rooms.

The importance of observing very great care is shown by comparing the two following reports, taken from schools in the same city, and apparently provided with a similar water-closet arrangement in the basement:—

(A city school of 400 pupils.) “A series of closets over long trenches, in which water is always standing; flushed twice a week; ventilated by a six-inch pipe, some distance to chimney. The odors are sometimes perceived in the various rooms of the building.”

Another school in the same city reports: “Cemented bottom, partly filled with water, which is changed entirely every day in summer, and three times a week in winter. Ventilated by a shaft connecting with top of building. *No offensive odor,*” — partly because the scouring is more frequent than in the other case, but also because “the greatest care is taken to prevent odors from rising, by a thorough ventilation of the basement.”

As regards the other forms (pan and hopper closets), there are certain faults to be spoken of. A pan-closet presents many surfaces on which the discharges can collect: the stream of water is often too weak even to clear out the visible accumulations, and in some cases altogether fails to reach those at the back of the pan, &c.; so that, if not washed, it is apt to be offensive. The chief objection to the pan-closet, however, arises from the small chamber of foul air between the pan and the trap below it. A hopper-closet need not be open to this objection, provided the jet is *abundant and well directed*. One or two of these may be placed, if desired, in

each story and in the cellar, but each ought to have its window opening to the outer air.

For perfect ventilation of such places, nothing is better than a tube, leading to the chimney or open air, or one in the lower part of which (at a height of, say, three feet from the floor) a gas-jet is kept burning, giving rise to a current upwards: the gas may be made useful for light by inserting a pane of glass in the side of the tube. It may be well to add, that *wooden* tubes, traversing several stories, assist the spread of fire in a building.

Many schools, including some in country towns, report the presence of small water-closets in the first or second stories. If care be taken that these are well aired and cleansed, they are not objectionable, but positively desirable, in these situations. There is no doubt that girls especially require some such accommodation, as in a large class there will always be some who ought not to be exposed to the weather, nor to be forced to go up and down stairs unnecessarily.

In some schools, water-closets, apparently of the pan variety, are placed in the cellar, in number sufficient for the wants of the whole school. These will require at least as much watching as the water-vault closets above described. In planning a cellar, all such conveniences should be placed in an apartment strictly separate from that containing the furnace or the play-room, and should have access by windows to the outer air.

The necessity of interposing some obstacle to the rise of gas from sewers, through soil-pipes, into houses, has become generally known to the public. An S-shaped bend in the pipe, if placed in a proper situation, and if the soil-pipe is properly ventilated, will answer the purpose: there are various other contrivances, all equivalent to simple reservoirs of water, placed so as to intercept upward currents of gas, which need not be described here. But, whatever be the arrangements for trapping individual basins or closets in upper stories, it is essential that the main soil-pipe should be trapped before it leaves the building, at a low point, i.e., in the cellar. All soil-pipes should be easily accessible, should be in plain view or protected by simple removable wooden boxing, through their entire course. If enclosed behind lath and plaster, or sealed up under a cement floor,

their defects cannot be discovered without great trouble and expense. The best plumbing in the best-built houses is extremely liable to injury from slight settling of foundations, from corrosion, frost, or rats; and injury to health may result, before any strong odor is detected.

An earth-closet consists of a portable box, with a lid like that of a common water-closet, and worked by a handle in a similar way, only that the pulling of the handle throws a quantity of powdered and dried earth over the deposited matter, instead of sending a jet of water. The earth absorbs the odor in a nearly perfect manner, if it be well dried and powdered; sand will not answer the purpose; charcoal in powder is the best of all. No disinfectant is needed. The apparatus can be safely used in the house, when water-closets are not practicable: it is reported as giving satisfaction by two of the correspondents, but always requires a great deal of care in its management, in order to prevent the occurrence of bad odors.

A privy is a non-portable arrangement, in which the fæces are not deposited in water, but in a vault or other excavation, or on the natural surface of the ground. The privy can never be approved as wholesome; it is capable of injuring the health in many ways. In the commonest form in which it occurs in our country schools, the filth is either thrown upon the surface of the ground, in which case the person is dangerously exposed to cold air; or it is thrown into a pit, where it accumulates usually for a year at a time. A cheap, convenient, and wholesome substitute for this familiar nuisance is to be found in the "pail-closet," as described in the Report of the State Board of Health for 1876, p. 182, in which a pail made of half of a kerosene-oil barrel is placed under each seat, and the contents removed every week for a fertilizer. At the bottom of the pails a layer of ashes, or of dry earth pulverized, is first laid; and a sufficient amount, say a pint or more, of the same should be thrown in after each time of use, taking some little pains to cover up all deposits. Of the present usual form of privy, we quote the following from pp. 184, 185, of the report already referred to.

"It may be said that the simplest and cheapest of those privies, one much in use in the small country towns, involves the minimum of annoyance and risk, since whatever fæcal

accumulation occurs is all on the surface, and is in such free communication with the outer air as to be rapidly dried and disinfected. But at the best it pollutes the soil beneath more than is suspected. It is not cleared out one-tenth as often as is needed, and it exposes those who use it to the inclemencies of the weather to a dangerous extent."

Privies upon the pail-system, properly cared for, need no other disinfectant than that here mentioned, viz., dry earth or fine ashes, except perhaps in the hot weather of midsummer. Privies of the old-fashioned country sort cannot be properly disinfected; for the greater part of all their contents will soak in and contaminate the soil to an indefinite extent, sometimes to a distance of many rods, — in one case, filth was traced in the soil for a distance of nearly a mile. No well in their vicinity is safe. In the present Report of this Board, under Health of Towns, an instance is given where a well used for drinking was located under a schoolhouse, at a distance of thirty-five feet from privies: a chemical examination showed the presence of unchanged excrement in the water of the well. Even a vault of masonry is not always free from cracks, nor are its imperfections likely to be discovered while it is in use as a privy.

To the question, "Are they properly emptied and disinfected?" a negative was returned in fourteen cases; in one instance the correspondent seems to have mistaken the question, and replies, "They empty into sandy soil a few feet below surface." This form of "emptying" the contents is, in reality, the usual one in all country places. The impression seems almost universal, that the earth destroys all poisonous matter as soon as it soaks in; an impression which is practically and most dangerously false. The greater number state that they are emptied once a year; and this seems to be thought often enough. One-fourth of the whole number, however, state the arrangements are "the source of offensive odors;" and no one can doubt that this is an understatement of the fact.

A privy under the same roof that shelters the school ought not to exist for a moment. It is true that delicate children ought to be spared exposure; it is true that the fear of exposure in winter, or a natural shrinking from the foulness of ill-kept privies, leads many little children to conceal

their natural wants, to their bodily harm. But provision for such cases can be made in small country schools by the earth-closet; in large schools there should be a few water-closets, and the main out-house, when there is one, should communicate with the school by a dry covered way. Most children will require to visit the place once in the school-day, and it is not right to turn them out of doors in all weathers for the purpose. This point is almost universally neglected.

In only four cases is it reported that the boys and girls have to use the same privy. It is desirable to take certain precautions in this matter: there ought to be two buildings, and not one divided by boards into two parts; a board fence should separate the two sexes in going and coming; and, where present arrangements are bad, the boys should have their recess at a different time from the girls. To insure decency, and to check immorality, a trustworthy monitor might be appointed not only for recess, but to accompany every child who goes out during school-hours.

*Quotations from Correspondents.*

FROM FIVE CITIES.

(School of 525 pupils.) "Privy emptied once a year. Water-closets in cellar, only ventilated by windows."

"Privies never emptied and disinfected."

(A grammar school.) "Vaults emptied once in three years: no nuisance, no apparent need of disinfection; occasional odor from cesspool in yard."

"Generally, I think the city schools are inadequately ventilated, imperfectly heated, with radically defective privy accommodations."

(A primary school.) "The exposure and bad odor keep many children from going when they ought to go. How much this has to do in the causation of disease, I am unable to say."

"To those who use the privies, they are too frequently offensive, from carelessness of janitors."

"Privy out of doors: built of brick, with large vault, most of the time full of water, so leaky that for the last twenty years it has never been properly emptied, disinfected, or ventilated."

FROM TOWNS.

(A large and important town.) "We have only one school in the town which I could pronounce free from the danger of offensive odors: the other schools do more or less produce them."

"All through the warm weather an offensive odor pervades the whole building, especially if the wind is from that direction. Privies twenty or thirty feet in rear."

"The vaults are capacious, and I think several years since were cleaned out."

"The building has a cemented brick vault nearly four feet deep; a very objectionable arrangement, and difficult to clear out."

A *large* receptacle may serve as an excuse to neglect frequent cleanings; and the absence of an outlet, and of a water-supply to flush the vault, would make any such structure objectionable. Storage of feces in a concentrated form must be an evil: otherwise cement and brick are certainly desirable elements in the structure. The vaults of another school, described as "inclined, with a drain-pipe from one corner of the schoolhouse entering the upper end, so that each rain washes the vault," and of still another, in which the "water from a large reservoir can be discharged through the vaults weekly, carrying the contents into a sewer," deserve credit for doing what may perhaps be the best thing attainable under the circumstances, but which should nevertheless be utterly condemned as unsuitable substitutes for direct flow into the sewers.

In a school for one hundred children, there are two privies (and no water-closets) in the cellar; "the solid matter is carried into a cesspool forty feet from the building, by water from roof and from sinks in cellar." Such a water-supply would naturally be uncertain; we should expect to find, as is stated, that the privies are "not in good condition at time of examination, and the means employed for removing contents does not appear to work at all times efficiently;" and, although there are no odors detected in the schoolrooms, the house cannot be regarded as safe in its present state. The absence of urinals for boys is noted.

(School of 82 children.) "A double privy stands four feet from main building; no vault: excrement falls directly on the ground; never cleansed or disinfected; an apartment is supposed to be allotted to each sex, but there is nothing to show which is for each. Children exposed to weather in visiting them. Offensive odors. Primary schoolroom is next to privy."

"The scholars are exposed to the drippings from the eaves of the school-house, which makes the sloping ground dangerously slippery in winter."

"All our privies are about as filthy as possible."

"The privies are near to the building, and of the *worst possible* construction, and in the worst possible condition. No kind of regard has been paid to cleanliness or decency in any of them. In my opinion, the greatest desideratum in our schoolhouses is more air space *per*



*capita*.—a system of ventilation,—and an organized system of care for the privies.”

(A high school.) “Four sets of privies, five holes in each set, with one cesspool; they are without doors, and are all in the cellar, and abut on each side of the central partition, those on one side being for boys, and on the other for girls. Not properly emptied and disinfected. *Decidedly* offensive odors.” [This statement of the master is emphasized by the medical reporter, who says that the air of the second-story rooms is contaminated by the privies; “a state of things infernal in its origin and its character.”]

“Privies in an addition to building. Entrance through the basement. Good care is taken in emptying them. All the care possible is taken to prevent any injury to health from this source in our schools: but where privies are connected with the basement, where the furnaces are situated, I have no doubt the air becomes more or less poisoned. I have in my building to keep the basement-windows open, in the coldest weather, to prevent this. A very little neglect might cause much evil.”

A primary school for 108 pupils has privies “on the lower side of the basement near the wall; the basement-windows are kept open in summer, but in winter they are closed, and there is a bad smell.”

(School of 268 pupils.) “The boys have the habit of using the floor instead of the seats.”

“There are four open privies, two in the upper story, and two in the lower, poorly ventilated, and not connected with sewer. They are situated just in the rear of the schoolrooms, and open from them; are not in any way properly cleansed, and reek with foul odors, which penetrate the schoolrooms when the doors are opened. They open directly from the recitation-rooms.”

In another (high) school in the same town, “the privies were surrounded by, and floors covered with, faces in all stages of decay and rottenness, which the teacher endeavored to excuse by laying the blame on the janitor.”

### ILL EFFECTS ON HEALTH.

*Questions.*—Do you attribute to exposed or ill-managed privies any ill effects on the health of the pupils? If so, what?

A very large number reply in the negative,—82 in all. Some of these are careful to confine their statement to their own schools, admitting the possibility of injury in other cases; a *very* few claim that no evil has resulted, simply because their privies are kept in perfect order; while some express surprise that harm has not occurred.

One negative comes from the school where the privies open directly from the schoolrooms,—the quotation last given. Yet no one could hesitate in pronouncing the state

of things there existent extremely dangerous. But no case of disease had actually been traced to that cause, at the time; and the amount of simple ordinary debility caused by a slowly-acting cause is often very hard to estimate, when one meets the subjects of it as constantly as the master of a school does his pupils.

That such debility may be produced by ordinary "stinks," by living in an air containing faecal odors simply, is certain; and from this debility up to the production of headaches with slight fever, or of violent, even rapidly fatal cases, of typhoid, there are all possible gradations. Yet the danger lies often far more in that which is not offensive,—in the air which contains sewer-gas, hardly noticed by many; in the sparkling water which pleasantly disguises the dose of liquid ordure which the pupil takes daily at twelve o'clock.

The connection of diphtheria, scarlatina, dysentery, and diarrhœa, with foul odors and bad drains, is now admitted to be a fact, though not always a traceable one. The views given in the following quotations need not be qualified.

#### *Quotations from Replies.*

"Catarrhal diseases of the respiratory and digestive organs [through exposure to cold]. I am convinced that dysentery has sometimes been due to exposure in such filthy privies as that alluded to; and, although I can give no instance in which I can say with absolute certainty that typhoid can be traced to these privies, I know that there have been more cases of that disease among the scholars and in the neighborhood of the school this fall than for several seasons past."

"I think it tends to lessen the activity of pupils, brings on indigestion and debility, sometimes typhoid fever."

"I think I have seen the vitality of children so lowered that they did not as readily resist the effects of exposure."

"I have observed more prevalence of scarlatina in those districts where little or no care was given to such cleanliness; and I have a conviction that diseases, especially those termed zymotic, are aggravated by exposure to the poison of foul privies."

"In one instance there are two unsealed vaults, eight feet square, on sandy soil, both within thirty-five feet of the well. Two fatal cases of diphtheria occurred during the past summer among the pupils attending the school to which exception is here taken. It is not presumed to take the responsibility of saying that these cases were caused by this means; but the cases did occur, and there are the vaults within thirty-five feet of the well supplying the pupils with water."

"I do not in this school. I am convinced, however, that we have had

several cases of typhoid fever, as the result of poorly-constructed privies connected with other buildings. These same schools are often troubled with *bad odors*."

"I have attributed many of the low continued fevers which we have to treat amongst school-children, in a great measure to this cause; that it is often the channel through which the germs of scarlatina, measles, whooping-cough, &c., are conveyed to our school-children."

"The presence of diphtheria in school led the conservators of the health of the children to look more carefully to the sanitary condition of our premises: hence the change in the construction of our privies. I leave it for others to draw their inferences. The same cause [viz., total neglect] has been in operation for twenty years, with no appearance of the above disease until now." [It is very characteristic of the production of zymotic disease, that the nuisance often exists for a long period before the outbreak comes; and the fact that a nuisance prevails twenty years without causing specific disease does not insure against an outbreak in the twenty-first year.]

#### CONTAGIOUS DISEASES.

*Questions.*—What is your experience in respect to the spread of contagious disease in schools, and the remedies or means of prevention? What is your *opinion* as to such prevention and the means to it?

There is very little real discrepancy of opinion in the replies. With scarcely an exception, all acknowledge the danger of contagion to be real; although a number (fifteen) say that the school or the town they represent has never been troubled with the spread of contagion in and through the school, or that the town itself is remarkably free from epidemics. In the quotations to follow (thirty-three in number), almost every one expresses a conviction that the contagious diseases *have been spread* through the agency of their schools; and, in addition, fifteen other towns have expressed the same belief, but are not here quoted. Of the rest, the larger number refrain from expressions of opinion.

From the care taken in most of the replies, it is evident that the question has been regarded as important. In general, the preventive measures suggested are practically similar: they include dismissal of the affected child, his retention at home (for a period which is stated in only one or two cases); disinfection of clothing and room or house; disinfection of schoolhouse on the appearance of a contagious disease in a scholar; ventilation and cleanliness; the refer-

ence of the matter to a physician in each case; entire isolation of patient; exclusion of neighbors or other visitors during sickness; exclusion from school of the entire family when one member is attacked; suspension of the school; a medical man upon the Board of Selectmen; better statute regulations defining duties of Boards. The extracts give a fair view of the relative frequency of these views.

### *Extracts from Replies.*

"During the prevalence of an epidemic of diphtheria, facts seemed to indicate that it was transmitted by members of families where it prevailed being allowed to attend school."

"Scarlatina, diphtheria, and whooping-cough have been communicated at school. No precaution has been taken against this, except to keep at home children of a family where there is a case of the first two diseases. This rule is not always observed. I think that in a town of our size (Hingham) the spread of contagious diseases can be materially checked by such means."

"All but one school with two departments were closed a year or two ago, to prevent the spread of diphtheria."

"Scarlet fever, measles, and whooping-cough have spread through the medium of schools in this town."

"Whooping-cough has been widely spread by means of the schools, often infecting more than half the scholars of one school. This seems well-nigh impossible to prevent, as it is hard to distinguish the disease, certainly in its early stage. I have known a few instances of scarlet-fever being caught at school."

"I know that whooping-cough and measles are often spread in schools here, and have no doubt that scarlet fever sometimes spreads thus. The same may at any time be true of diphtheria. As to *quarantine* for pupils convalescing, or coming from infected families, we have not the requisite uniformity and formality."

"My belief is that there are not proper precautions observed. In one notable instance, pupils went from one school (at which some of the scholars had been taken with scarlatina) to another school, carrying the infection with them, and breaking up the school, themselves suffering with the others."

"I have known epidemics apparently propagated from school as a centre many times. No precaution has ever been taken, to my knowledge, by any of our school or town authorities, in regard to preventing the transmission of contagious diseases. Scholars are allowed to attend school frequently as soon as they are able to get out of doors after scarlet-fever, measles, diphtheria, &c. No regulation as to vaccination is ever enforced. Have known cases where a large majority of the scholars in a school have had scarlatina during a term, all directly traceable to one case imported from Lowell."

“Have seen them spread rapidly when the sessions have kept up; but have seen them controlled by dismissing the schools, and isolating individual cases.”

“The two diseases which in epidemic form are most likely to seriously reduce the attendance in the public schools are measles and scarlet fever; and in this respect it seems to me that the effects of the former disease are often more marked than those of the latter. I think that very many of those children who are seized with either of these diseases while attending school regularly would still have them, even if they were kept at home.”

“Contagious diseases are not known to have been spread among our school-children except by the agency of cases so slight as not to come under the observation of any physician; and the only available means of prevention seem to be the exclusion from school of all infected persons, and members of their families.”

“I think I have known children to have serious preliminary symptoms of both the former diseases [diphtheria and German measles] while yet in school, — fever, headache, dizziness, sore throat, swollen tonsils, nausea, chills, &c., during the last day of school attendance, — and then follows a very serious, perhaps fatal illness, but without, as far as traced, any obvious dissemination of the disease in school.”

“The milder contagious diseases are of course spread in the schools, and cases are not wanting where scarlet fever and diphtheria have been communicated. It is some years since either of the last-named diseases has been any thing like prevalent here, — cases being few and for the most part isolated. The school board have full and sufficient regulations in regard to contagion, and enforce them as far as they are able.”

“That contagious diseases do spread from scholar to scholar; that so-called intelligent parents do not withdraw pupils from school when they know, or ought to know, that they are liable to transmit disease; that, if teachers exclude, they frequently act injudiciously, being obliged, commonly, to be guided by hearsay evidence, and frequently receiving such information only after the mischief has been done; that physicians do not do their duty in the matter, for fear, I assume, of *giving offence* to patrons; that Boards of Health, in the different cities, should be *required*, and their duties in the presence of contagions as *definitely fixed as possible by State law*. ‘What is everybody’s business is nobody’s.’ At the present time children are dying by the dozen, in Haverhill, of diphtheria; and I am not aware that any concerted action is even projected in reference to checking the spread of the disease.”

“I have no doubt that diseases are spread from schools in many instances, and oftentimes when the contagion or source of contagion is not suspected. It is my belief that such spread may be very greatly diminished by the adoption of suitable measures by health officers and committees. Public sentiment on the subject should be enlightened; and a just appreciation of the danger from this source would make the adoption of preventive measures an easy matter.”

“The ordinary diseases of children usually go through our schools when once they have entered. We take no precautions against the spread of

the same; do not allow pupils from the families where sick of small-pox to remain in school."

"If thorough ventilation, pure water, proper disinfection of vaults, and removal of their contents, could be secured, a great point would be gained toward the disappearance from our schools of these diseases."

"Most imperative needs are clean bodies, clean clothes, and proper ventilation."

"Do not think they spread from schools to any great extent. Where a scholar is taken sick with a contagious disease, the other children of the family are immediately taken from school. Many other parents, through wholesome fear, keep their children at home; and it is not uncommon for a school to be temporarily suspended before many children become sick. I think these means are efficient in preventing the spread of contagious diseases in schools."

"I think there can be no question as to the propriety of closing the schools at once, as it is difficult to enforce any precautionary means among children, owing to the general apathy of parents concerning such matters."

"No sick child should be allowed to go to school until it is ascertained whether it has a contagious disease; and, if so, all children exposed should be kept away from school two or three weeks, and the sick for two or three weeks after recovery."

"Clearly, *every* known means should be employed, — cut off *all* possible communication with school by family attending school, by neighboring children visiting infected family, by *any* person visiting the family, by calls from teacher to house, and all such means."

"That they spread rapidly in schools; and that, whenever they make their appearance in any serious degree, — and scarlet fever and diphtheria are always serious, — the only thing that promises any benefit is their suspension."

"When such diseases appear in one of our schools, it is usually stopped by the committee, though usually not in season to prevent spreading."

"Upon the appearance of any suspicious symptoms, competent medical advice should be furnished at public cost (notice being given by teacher or parent), and strictly followed. The committee is usually negligent in such cases, and seldom capable of deciding in regard to the exigency: therefore a medical opinion is indispensable."

"Take a sick child home, and send for the doctor. Don't scare the rest to death, without the above doctor thinks it wise."

"Our regulation might be made more effectual if teachers had immediate knowledge of the existence of the disease. I think physicians should be required by law to report such cases to the proper authorities."

"The matter should have responsible, paid, medical attention, of such character as to insure the education therein of teachers, doctors, and parents."

"Our Board of Selectmen constitute the Board of Health; and I would respectfully suggest the importance, the necessity, of having one or more regular physicians on the Board of Health of every town."

"Neither they nor their brothers or sisters should be allowed to attend

school again till all evidence of disease has passed away, and both they and their clothing and houses have been properly disinfected and cleansed. If necessary, in times of epidemics, have physicians to examine the schools daily, or close the schools altogether. Probably no means could be enforced that would prove absolutely protective."

"Every town should have a Board of Health distinct from its Selectmen, one member of which should be a physician; and this Board should study to maintain cordial relations with the teachers and with physicians in town. They should hold *stated meetings*, at which reports should be made, and should report yearly to their towns, and to the State Board of Health. During epidemics or in case of prevalence of disease in any house or small neighborhood, it would be desirable (and I think not impracticable) that attending physicians should report to the local board the convalescence of school-children, and the sanitary condition of premises, including disinfection."

"The statutes should limit the number of the Board of Health to *three* in towns having less than ten thousand inhabitants."

"In cases where small-pox prevails in the city, a daily report is made to me by the truant-officer, and all exposed pupils are removed. The house is fumigated every night."

### *Boston Schools.*

The courteous action of the School Committee, in sending the circular upon which this paper is based to the heads of all school districts under their charge, has brought together a considerable amount of information. Fifty-five replies have been sent in, accounting for nearly all the school-buildings. The total number of buildings used for schools within the limits of the city is 159, containing at the present time 49,423 pupils, with an estimated population of 353,000.

The character of these replies is not very strikingly different from that of the others. A very few sites are spoken of as damp, or low, or unhealthy. Dampness of cellars is mentioned in six replies, and in three of these it is also stated that the cellar is used occasionally for a play-room; this, it should be remarked, is a possible source of illness. The construction of many of the privies is of the old-fashioned sort; but as a rule they discharge into a sewer, and in most cases can be flushed either by showers or by the Cochituate water. There is a great deal of complaint, of course, as regards the odors. Twenty-three replies state the existence of offence from this source, or, in some cases, from urinals.

As in the case of country towns, very few attribute direct injury to the health of pupils, to this species of nuisance; a

few, however, complain in strong terms. The City Board of Health in 1876 said, —

“The old-fashioned vaults of a century ago are still in use,<sup>1</sup> and are made to accommodate the several hundred pupils attending each school.”

And the writer is informed by them that the state of things has not changed much.

The Board continue in saying that, —

“All vaults of this character, either public or private, are invariably a nuisance. They should be abolished, and water-closets instituted wherever the drainage will permit. At the request of teachers and others, we have made a thorough examination of a large number of these privies, and found them to be extremely offensive, not only to the teachers and scholars, but to the residents in their vicinity. The odors escaping from them pervade the schoolrooms, causing nausea, compelling the teachers to close the doors and windows, to exclude the disgusting scent which even then penetrates the rooms, especially when the atmosphere is warm and muggy, and the scholars are most in need of pure air from without.”

Large schools in the suburbs, not connecting with sewers, require peculiar care in this respect; their privies should either be on the pail system, or should have tight vaults, with dry earth or ashes at the bottom, cleaned out every week.

The ventilation is more or less complained of by nineteen. A few lay emphasis on this point, and on personal cleanliness, as important means of checking contagious disease; and this view is certainly correct to a considerable extent. A vast deal depends on the personal character of a teacher, his or her neatness of person and habits, and tact in suggesting improvement to the pupils; and a most important field of effort is properly suggested by one writer, in visiting at the scholars' homes, both for this purpose and to relieve actual deficiency of clothing.

The danger from contagious diseases is not thought considerable, under present circumstances, by most of the respondents, inasmuch as careful regulation and control over that matter have been instituted by the School Committee.

#### *Extracts from Replies.*

“Walls are cement on outside. Sometimes rain comes through.”

“None of the schoolrooms (primary) are sufficiently exposed to the sun.”

<sup>1</sup> This remark is not intended to apply to all the schools.



"The cellar story is used for play in stormy weather. Slightly damp, owing to lack of sun."

"The bad air from the drain, or water-closet, or both, is at times a most intolerable nuisance. Many attempts have been made to abate it, but without good results. It is said that all the neighborhood suffers in the same way."

"Behind the privy is a stable, which at times sends forth disagreeable odors."

"The boys' urinals should be located at a distance from the main building."

"Coal-gas or carbonic oxide. People do not know how to manage their stoves and furnaces. Janitors, as a class, are almost entirely ignorant of the effects of this poison. They all need instruction."

"Our comfort, health, and happiness have been greatly promoted by the services of an intelligent, neat, and faithful janitor. He is only fairly paid, and there is reason to fear that his pay may be cut down. This kind of economy is very expensive in health and comfort. I most earnestly protest against the practice, quite too prevalent, of employing any one who can sweep, or shovel coal, as the janitor of a schoolhouse."

"Privies so constructed that a large amount of excrement lodges on an inclined structure above the drain. The Board of Health [city] condemned our privies in strong terms two years ago; but nothing is done about it yet, and there seems to be no prospect. We have a covered way from the back door to the privies, but we keep it locked all the time, as, with the wind in certain directions, the odors are very offensive. The pupils go down to the basement, up into the yard, and enter the privies by a side door."

"The building ought to be raised five feet; the water-closets removed from the building, and properly ventilated. The house is not fit for any human being or animal to live in."

"No water-closet for teachers, except outside the building."

"I have never known the privies to be emptied." [The school has been built twenty-two years.]

"When the wind is east, the basement is sometimes full of foul odors."

"In one of my primary-school buildings, a sewer-drain ran through the cellar, and the odor pervaded the building. The children were sickly, and I noticed sores upon some of their faces. The teachers were ailing, and did not know what was the matter."

"Nausea, vomiting, severe headache, drowsiness, and general unfitness for school work. The odor is sometimes so offensive as to make it undesirable to open the windows for a change of air." [The privies are outside of the building.]

"The schoolrooms are low, badly ventilated, — chiefly by windows. The privies empty into a closed vault, — no outlet. They are sources of offensive odors. The neighbors have complained to the Board of Health of the city of Boston. Scarlet fever, diphtheria, diarrhœa, and kindred filth diseases, have been very fatal among the pupils: due in a large degree, I think, to improper ventilation and offensive odors."

"I think very stringent rules should be made in relation to the cleanli-

ness of pupils attending our public schools. It might be well to appoint an officer whose duty it should be to inquire into the condition of families in this regard, especially in certain localities."

"Soiled clothes, especially when wet, are a source of offensive malaria in schoolrooms. The parents are too poor, in many instances, to supply their children with more than one suit. Here is a field for benevolent people to operate in."

"Larger clothing-rooms, that the clothes of each child may be isolated. The clothing now in some schools is two or more garments deep, and has been the means of communicating disease, or, at any rate, vermin."

"Crowded, poorly-ventilated rooms are perfectly adapted to the spreading of any contagious disease."

### GENERAL CONCLUSIONS.

A. The report is based on returns from nearly all the school-buildings in Boston, the total actually in use being 159, with an attendance of 46,418; also from schools not in Boston, estimated to number 400, with 40,000 children, or about one-sixth of the corresponding school population.

B. The sites chosen appear to be high, and well lighted in most cases; very often unprotected from the weather. The drainage of country school sites is reported as bad in one-seventh of the cases; in Boston, in a few. Among the points complained of by correspondents, the following are the most striking:—

Dampness of walls or floors. Stagnant water in neighborhood. House originally set too low for drainage. Entire absence of sunlight in a room. Nuisances from loungers.

C. The ventilation is very generally said to be poor; the heating, in most cases, to be adequate; the floors and walls of rooms to be dry. Complaints are made of misdirection of funds, by which exterior ornament is added, to the neglect of essential portions of the ventilator-apparatus. Certain forms of stove objectionable. Bad location of ventilators in the room. Coldness of floor, with undue heat of upper air. Inattention to the state of the atmosphere, on the part of teachers; and sudden opening of windows in cold weather. Neglect by janitors.

D. A cellar or basement is absent in a number of country schools. When present, it is usually employed for storing fuel, and for furnaces; often also for play-rooms; not infrequently for water-closets or even privies, and in a very

few cases for schoolrooms. A communication with the privy (out of doors) exists sometimes; and the necessity of strict attention to the state of the air in cellars, and constant ventilation *in all cases*, is appreciated by a number of correspondents.

E. Water-closets are frequent; earth-closets only twice mentioned, both times with approval. As to privies, those of many country schools have no vaults at all; and where vaults exist, they are scarcely ever emptied as often as they should be (*viz.*, once a month at the least). Exposure of the children to the weather in visiting privies is very general, and by some is considered a source of disease. Separate provision for the sexes is usual. Offensive odors are usually complained of; a few very aggravated cases are given. Ventilation of the privies is not often in a proper state. The following are the chief additional complaints:—

Privies in cellar, or opening directly into schoolrooms or basement. Vaults draining into soil; emptied rarely or never; leaky; flushed only by occasional rain-fall; without outlet; built so as to be inconvenient for emptying. Absence of vaults. Gross filthiness of scholars.

In the city of Boston, a large number of vaults discharge at a point eighteen inches above the bottom; thus in many cases a layer of faecal matter is formed, which probably is never wholly removed by flushing. Some are only flushed by rain from the roof,—a very uncertain supply. Others are furnished with jets of Cochituate water. Of late years, a good many have been made upon correct principles, *viz.*, with bottoms cemented, and inclined to an outlet; the latter is closed with a plug, which is daily removed, and the whole cavity flushed.

Few correspondents have ascribed injury to health directly to the state of privies. The effects mentioned by those who speak of them are, catarrhs, dyspepsia, debility, diarrhœa, dysentery, and zymotic disease.

F. Many of the replies indicate an absence of experience in regard to contagious diseases in schools. Of the country correspondents, however, one-third express an opinion that schools are a frequent cause of the propagation of such diseases; often so, in their own experience. The usual preventive means (isolation and disinfection) are mentioned in

various forms by a considerable number. In Boston and some other cities, the preventive measures adopted by the authorities are considered to have reduced the danger from this source to a small amount. In lieu of a summary of the opinions of correspondents, the reporter would here offer a statement of the points which should be attended to in framing

*Rules for Preventing the Spread of Contagion in Schools.*

1. Vaccination, — a certificate to be required of every child entering the public schools, as is the law now in Massachusetts.

2. Physicians to be required, under penalties, to report to local Boards of Health all cases of dangerous infectious diseases observed by them, the Board to inform principals of schools.

3. The existence of any case of such diseases in a house, to exclude the inmates from attendance at schools, for a sufficient length of time; the propriety of re-admission being certified to by a competent physician.

4. Disinfection<sup>1</sup> of premises and clothing, by the Board of Health, in every house where the above diseases have prevailed.

5. Medical authority to be designated, for the purpose of advising teachers and pupils, and pointing out to the school committee matters in regard to which their authority might be used to improve the sanitary condition of schools.

Finally, it should be clearly understood that schools are often blamed for evils not fairly attributable to them; and it is not meant that by any means all the influences injurious to health, during the school age, are due to the schools. Enough, however, comes from that source to make great improvement in that direction possible. Hereditary taint, bad home-education, insufficient sleep, late hours, improper or insufficient exercise, unsuitable food, clothes ill adapted to their true function, all come in for their share of blame; but even in these points, school-instruction, if under wise general directions, can do a great deal to counterbalance evil influences coming from other sources.

<sup>1</sup> As to disinfection, the reader is referred to the account of the methods now most approved, contained in the present Report, in a paper on Scarlet-Fever.







